

## EXAMPLE – 4

**HYPOTHETICAL – NEW ELECTRICAL GENERATING UNIT**  
**ASSUME 3 GENERATING UNITS (49.6 MW/UNIT)**

### TOOLS:

Emissions Factors (EF) BACT Emission Limits:

Pollutant	Emissions Factor (lb/hr per unit)*
PM	7.3
SO <sub>2</sub>	0.83
NO <sub>x</sub>	11.07
VOC	2.47
CO	10.78
Emission Factors - Greenhouse Gases from AP-42, Table 3.1-1 (Stationary Gas Turbines)	
CO <sub>2</sub>	110 lb/MMBtu*
CH <sub>4</sub>	8.6 E-03 lb/MMBtu*
N <sub>2</sub> O	0.003 lb/MMBtu*

\* 1 MW = 3.41 MMBtu

### PROBLEM SOLVING:

**Question 1: What would the emissions be for the proposed project?**

#### Example Calculations:

**PM<sub>10</sub> Emissions [tons/yr] =**

(3 Units) \* (7.30 lb/hr) \* (8760 hr/yr) \* 1 ton/2000 lb = **95.92 tons/yr**

**CH<sub>4</sub> Emissions [tons/yr]=**

(3 units)\*(49.6 MW)\*(3.41 MMBtu/MW)\*(0.0086 lb/MMBtu)\*(8760 hrs/yr)\*1 ton/2000lb = **19.11 tons/yr**

#### **Calculations:**

Calculated Total Emissions (Tons/Year):								
Criteria Pollutants Emissions					GHG Emissions (mass)			
PM <sub>10</sub>	SO <sub>2</sub>	NO <sub>x</sub>	VOC	CO	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	

**Question 2: On a mass basis, what are the total emissions of GHGs?**

$\text{CO}_2 + \text{CH}_4 + \text{N}_2\text{O} = \text{Total Emissions of GHG's (on a mass basis, TPY)}$

= \_\_\_\_\_ **TPY(mass)**

**Question 3: What are the total emissions of  $\text{CO}_2\text{e}$ ?**

Step 1: Refer to Global Warming Potential (GWP) Table (Title 40, Part 98, Subpart A, Table A-1)

Step 2: Identify pollutants and their respective GWPs.

Pollutant	Global Warming Potential
$\text{CO}_2$	1
$\text{CH}_4$	21
$\text{N}_2\text{O}$	310

$$\text{CO}_{2\text{e}}(\text{tpy}) = \sum_i (\text{GWP}_i \times \text{MassEmissionRate}_i(\text{tpy}))$$

$$\text{CO}_{2\text{e}}(\text{tpy}) \text{ Example} = (\text{mass } \text{CO}_2 * 1) + (\text{mass } \text{CH}_4 * 21) + (\text{mass } \text{N}_2\text{O} * 310) =$$

**Calculations [TPY] =**

= \_\_\_\_\_ **TPY  $\text{CO}_2\text{e}$**

GHG (mass) (TPY)	$\text{CO}_2\text{e}$ (TPY)

**APPLICABILITY ANALYSIS:**

**Question 1:** Does this facility require a Title V permit anyway? (e.g. major source, regulated pollutants  $\geq 100$  tpy)? (ARM 17.8.1204 and 17.8.1201(23))

**Question 2:** Does the permit action have GHG emissions in excess of thresholds?

- a. \_\_\_\_\_ Facility emissions  $\geq 0$  TPY GHG mass
- b. \_\_\_\_\_ Facility emissions  $\geq 100/250$  TPY GHG mass
- c. \_\_\_\_\_ Facility emissions  $\geq 75,000$  TPY  $\text{CO}_2\text{e}$
- d. \_\_\_\_\_ Facility emissions  $\geq 100,000$  TPY  $\text{CO}_2\text{e}$

**Question 3:** Does the permit action require a PSD analysis?

>100 tpy listed major source (ARM 17.8.801) Yes \_\_\_\_\_ No \_\_\_\_\_

>250 tpy non-listed major source

Yes \_\_\_\_\_

No \_\_\_\_\_

## **WHAT ARE THE NEW FACILITY'S PERMIT REQUIREMENTS?**

**If the Permit Decision occurs before 1/2/2011:** GHG's do not need to be considered

**Step 1: If the permit decision occurs between 1/2/2011 and 7/1/2011:**

### PSD

Does the facility trigger a PSD action "anyway" (exceed 100 tpy for a listed source or 250 tpy)?

- If NO, then GHG's do not undergo PSD review.
- If YES, do the GHG emissions exceed thresholds?  
 GHG mass  $\geq$  0 tpy \_\_\_\_\_ Yes/No  
 CO<sub>2</sub>e  $\geq$  75,000 TPY \_\_\_\_\_ Yes/No

- Yes to both thresholds - then the GHGs must undergo PSD review.
- No to either threshold - then the GHGs do not undergo PSD review.

### Title V

Is the facility a Title V "anyway" source?

- No - GHG's do not need to be addressed.
- Yes - GHG's must be addressed in the Title V Operating permit.

**Step 2: If the permit decision occurs after 7/1/2011:**

### PSD

Is PSD triggered for the facility?

For Criteria pollutants:

1. Do any of the criteria pollutants exceed 100 tpy for a listed source or 250 tpy?  
 - If Yes, then the facility must undergo PSD review for applicable regulated pollutants, and further analysis would be required to determine if GHGs are subject to PSD:  
 a. GHG mass emissions  $\geq$  0 tpy \_\_\_\_\_ Yes/No  
 b. CO<sub>2</sub>e emissions  $\geq$  75,000 TPY CO<sub>2</sub>e \_\_\_\_\_ Yes/No .  
 - If Yes to both 1(a) and (b) - then the GHGs must undergo PSD review.  
 - If NO to either 1(a) or (b) - then the GHGs do not undergo PSD review.  
 - If No, then proceed to #2.
2. Do the GHG emissions trigger PSD?  
 a. GHG mass  $\geq$  100(listed)/250 tpy \_\_\_\_\_ Yes/No  
 b. CO<sub>2</sub>e  $\geq$  100,000 TPY CO<sub>2</sub>e \_\_\_\_\_ Yes/No  
 - If Yes to both 2(a) and (b) - then the GHGs trigger PSD review and the facility must undergo PSD review for applicable regulated pollutants.  
 - If NO to either 2(a) or (b) - then the GHGs do not trigger PSD review.

### Title V

1. Is the facility subject to a Title V based on non-GHG pollutants?

- Non-GHG emissions  $\geq$  100 tpy \_\_\_\_\_ Yes/No
- If Yes, a Title V operating permit is required for this facility and must include GHG applicable requirements.
- If No, proceed to number 2.

2. Is the facility subject to a Title V based on GHG emissions?



- a. GHG mass emissions  $\geq 100$  tpy \_\_\_\_\_ Yes/No  
b. CO<sub>2</sub>e emissions  $\geq 100,000$  TPY \_\_\_\_\_ Yes/No

- If the answer is Yes to both 2(a) and 2(b), then the facility would need to obtain a Title V Operating Permit. The facility must include GHG applicable requirements.  
- If the answer is No to either 2(a) or 2(b), the facility would not be required to obtain a Title V Operating Permit.